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A Coordination Action to Prepare European Hydrogen and Fuel Cell Demonstration Projects on Hydrogen for Transport

The need for hydrogen specific support

ECN Policy Studies
The Netherlands
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HyLights is funded by the European Commission

The European Commission is supporting the Coordination Action "HyLights" and the Integrated Project "Roads2HyCom" in the field of Hydrogen and Fuel Cells. The two projects support the Commission in the monitoring and coordination of ongoing activities of the HFP, and provide input to the HFP for the planning and preparation of future research and demonstration activities within an integrated EU strategy.

The two projects are complementary and are working in close coordination. HyLights focuses on the preparation of the large scale demonstration for transport applications, while Roads2Hycom focuses on identifying opportunities for research activities relative to the needs of industrial stakeholders and Hydrogen Communities that could contribute to the early adoption of hydrogen as a universal energy vector.

Further information on the projects and their partners is available on the project web-sites www.roads2hy.com and www.hylights.eu.

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Project facts

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Project outline

- Coordination Action (CA), Framework Programme 6, Jan 06 – Dec 08
- Funding ~ 4 M€ and additional funds from industry

Framework

- Focus: Demonstration Activities on “Hydrogen for Transport”
- International dimension anchored in Executive Advisory Board (EAB), Associate Partner Group, proposal for liaison partnership with IPHE and by activities in individual work packages

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The partnership

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No.	Participant name	MS
01	L-B-Systemtechnik	D
02	Air Liquide Advanced Technology Division	F
03	Air Products	UK
04	Bayerische Motoren Werke	D
05	BP	UK
06	Centro Ricerche Fiat	I
07	DaimlerChrysler	D
08	Deutsche Energie-Agentur	D
09	Energy Research Centre of the Netherlands	NL
10	EniTecnologie	I
11	Ford Forschungszentrum Aachen	D
12	GM/Opel	D
13	Kellen Europe	B
14	Linde	D
15	Norsk Hydro	N
16	PSA Peugeot Citroën Automobiles	F
17	Repsol YPF	E
18	Shell Hydrogen	NL
19	Total	F
20	Vattenfall Europe	D
21	Volkswagen	D

European Commission

Associate Partners*

*** To grow over time**

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Overview

- The need for policy support
- What are appropriate incentives for producers and consumers?
  - Is it possible to stimulate hydrogen the same way as renewable electricity production?
- Which incentives are currently in place in the EU and the USA?
- Outline of a hydrogen specific support framework

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Need for policy support

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From a technology development point of view:

- The transition towards hydrogen involves system changes in all parts of the chain (production, distribution, refuelling and end-use)
- Hydrogen has to compete with alternatives which have a more incremental nature
  - Alternatives will fit more convenient in the current energy system
  - However, does not offer the same potential as hydrogen
- Each part of the hydrogen technology chain has specific barriers that need to be overcome
- A support scheme focussing on sustainability solely does not tackle these barriers efficient
  - Incremental innovation will also gain an advantage over the reference technology

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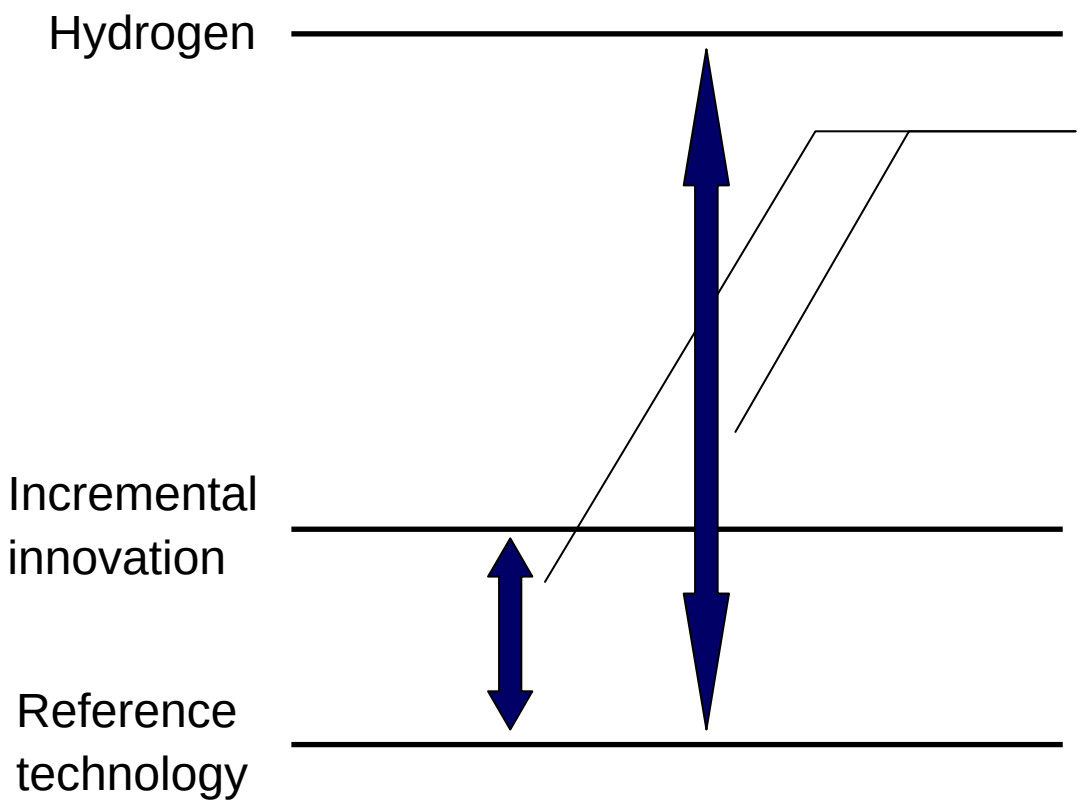
Policy support and incentives: Differences in competitiveness

Competitiveness



There is a gap between the reference technology and other technologies

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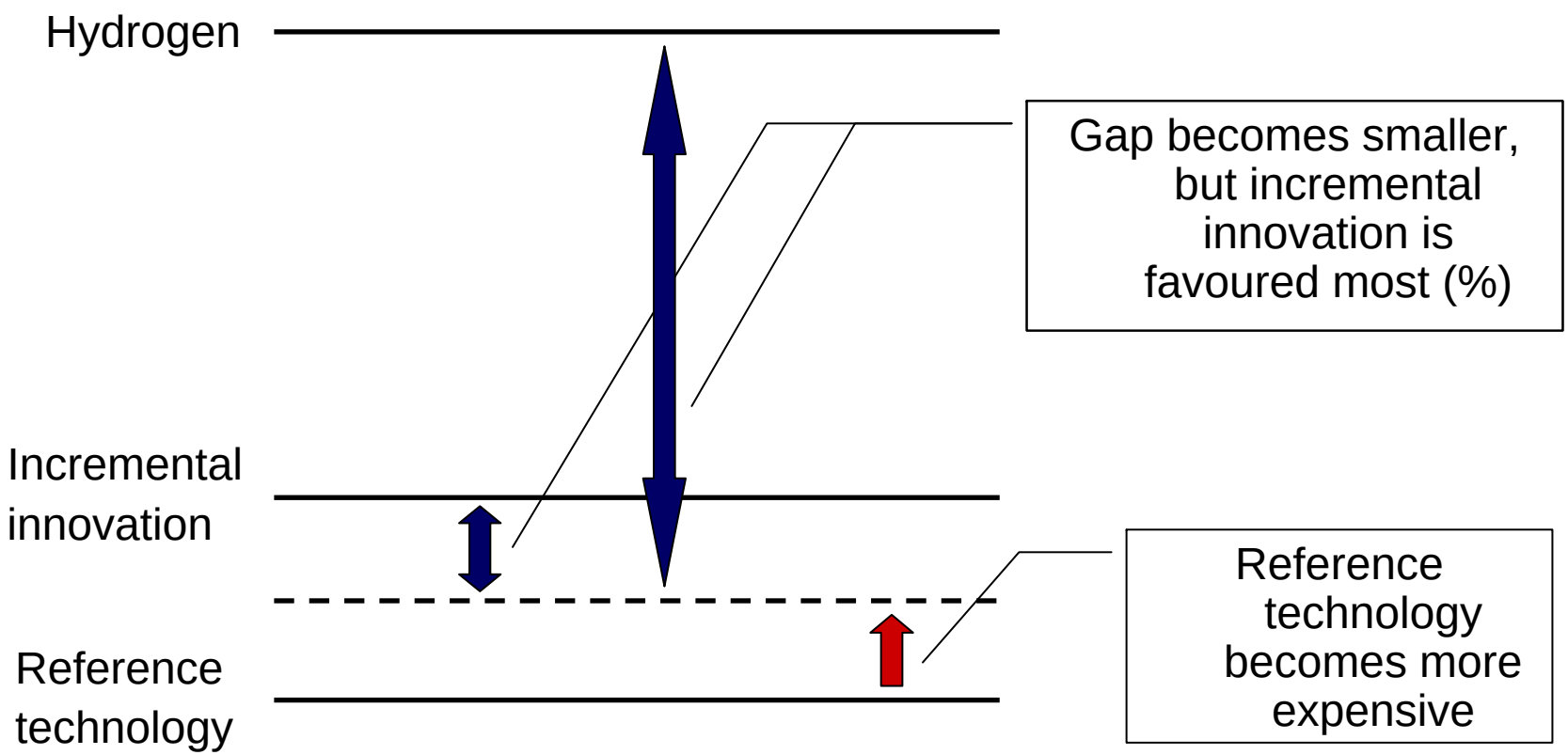
Policy support and incentives: Making the reference technology more expensive

Competitiveness



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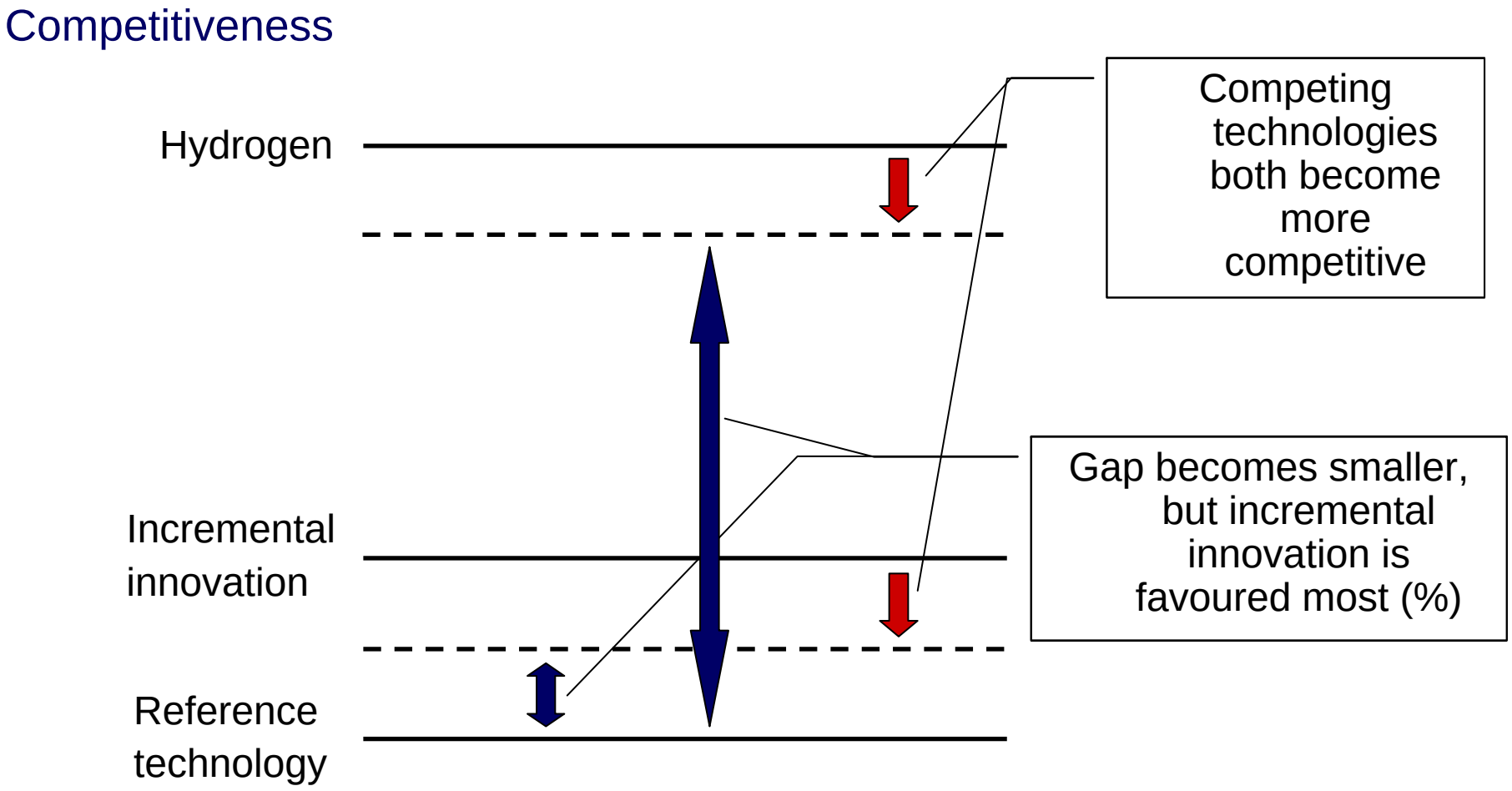
Policy support and incentives: Introducing a 'generic' support incentive



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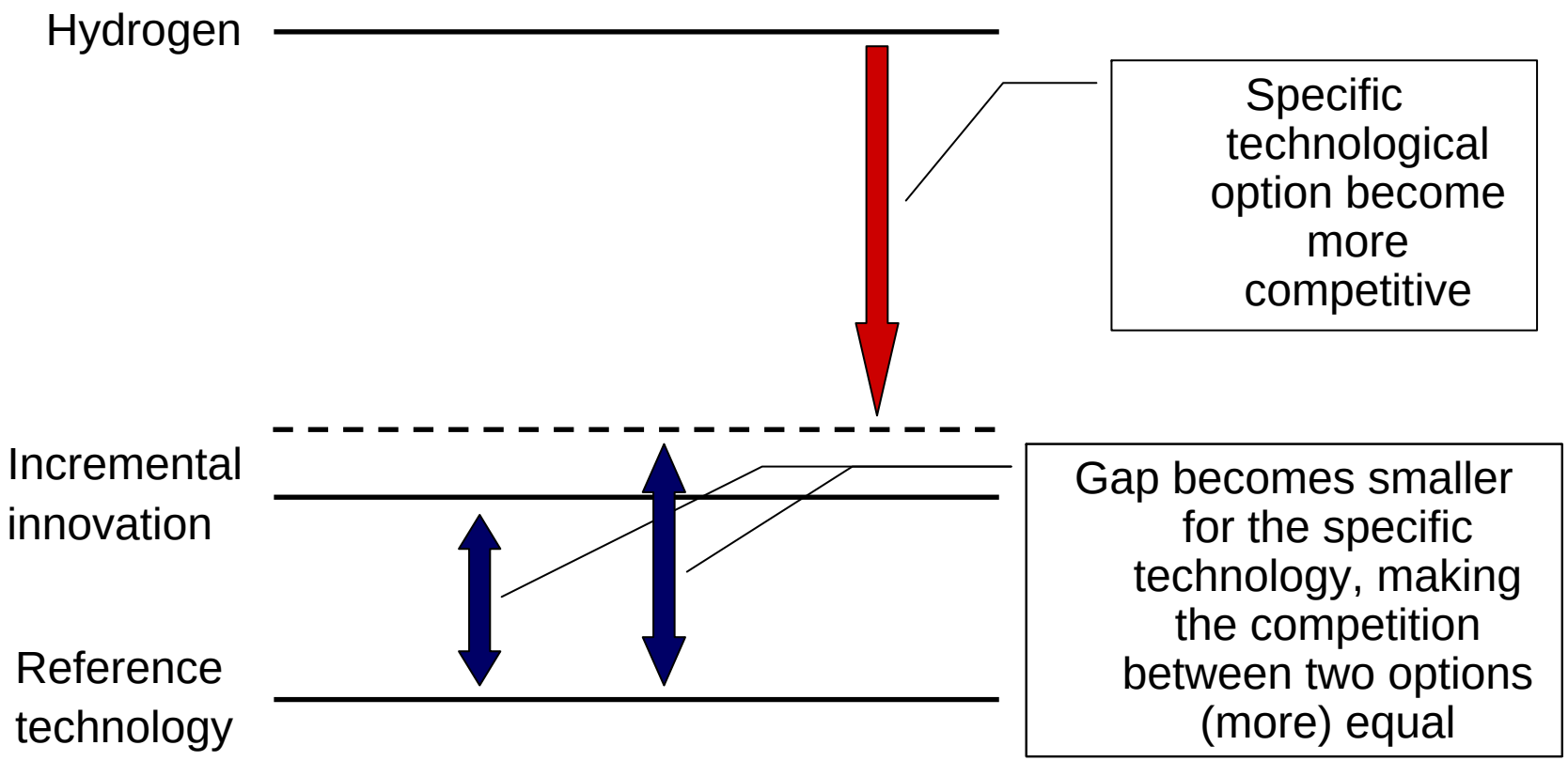
Policy support and incentives: Introducing a technology specific support incentive

Competitiveness



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Policy incentives

Is it possible to stimulate hydrogen the same way as renewable electricity (RE) production?

- RE incentives focus on market introduction (deployment) rather than R&D
- But (unlike for hydrogen): barriers are mainly in production part of the energy chain, not in distribution and end-use (electricity is a common good, while hydrogen fuelled vehicles are not)
- For renewable energy options, it is (usually) possible to calculate the additional costs compared to a reference technology, this is not the case for hydrogen
- Hydrogen needs a way more complex support scheme!

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Solving barriers in energy chain

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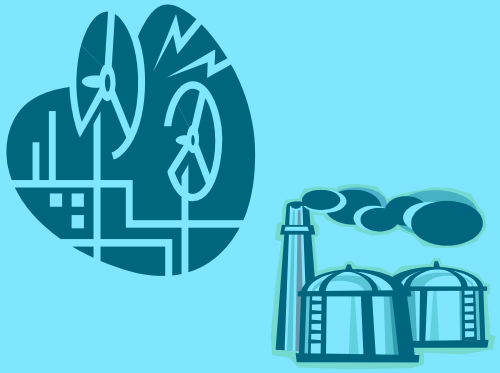
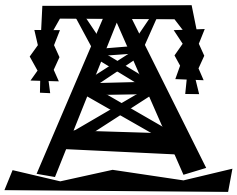
RES-e	Production	Distribution and storage	End-use
			
Policy support	Investment subsidy; Production subsidy		(Eco) Tax exemptions
RES-e price	€/MW; €/GJ	Exists, no need for (initial) financing	€/GJ
	Technology specific subsidy (“quality”)		Generic subsidy

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Solving barriers in energy chain

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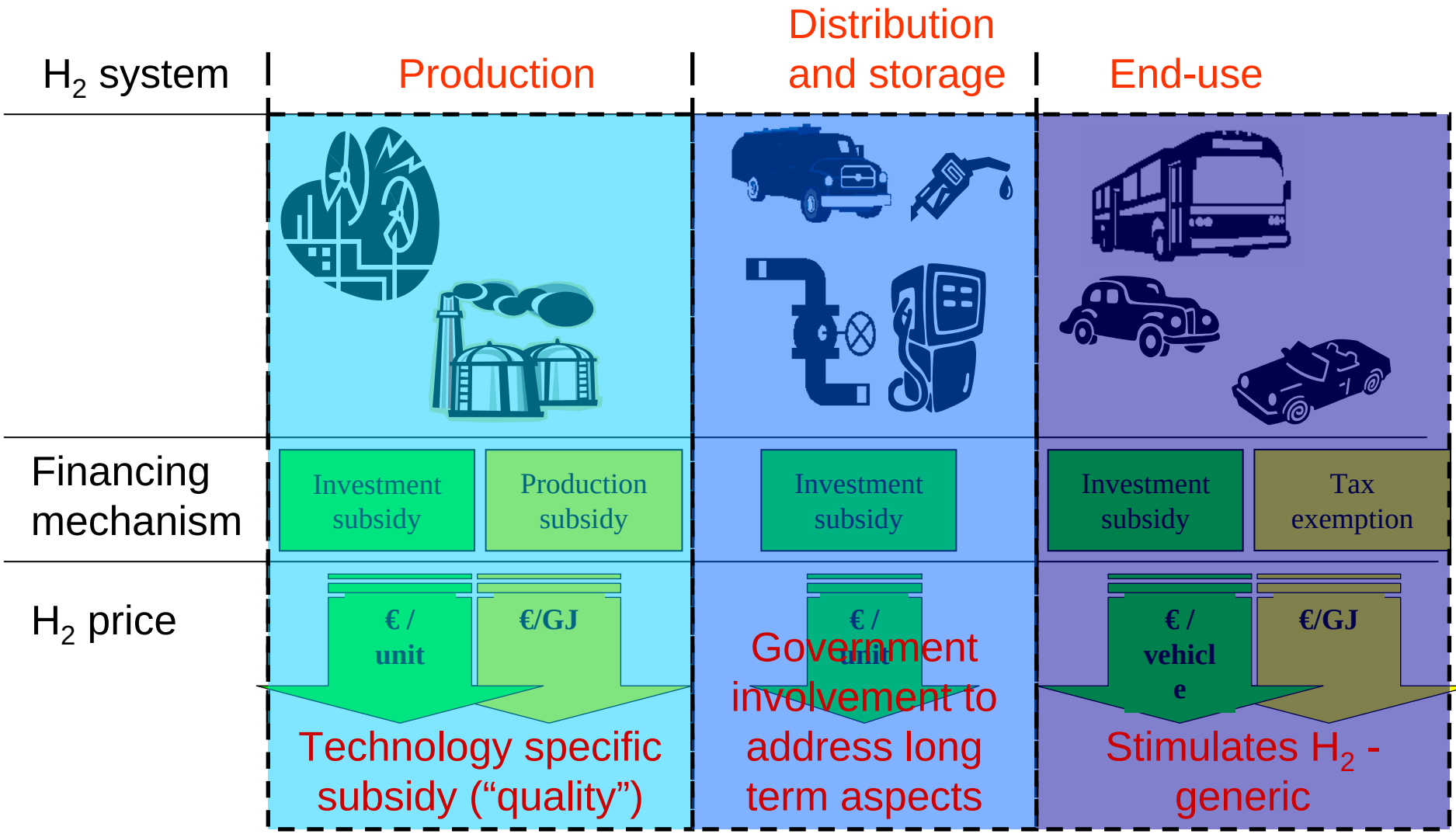

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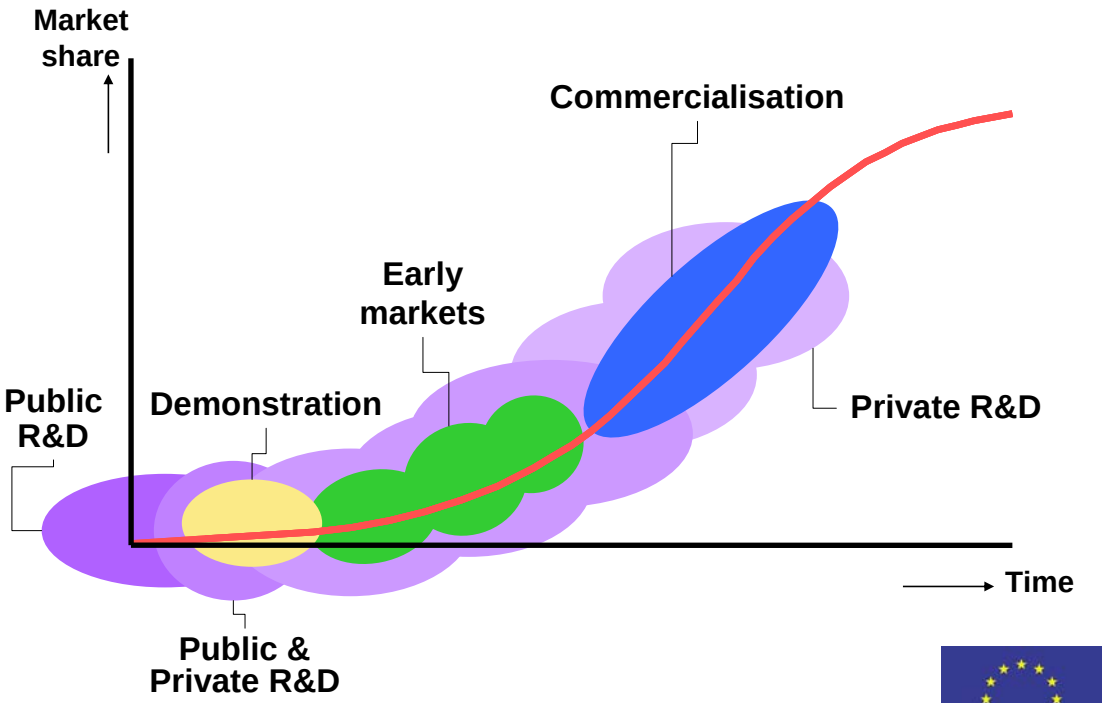
What are the possible incentives for producers and consumers?

- There are many ways of providing incentives for producers and consumers
- The incentive however needs to change (rapidly) in time
  - The technology development progresses fast and over- or under stimulating has to be prevented



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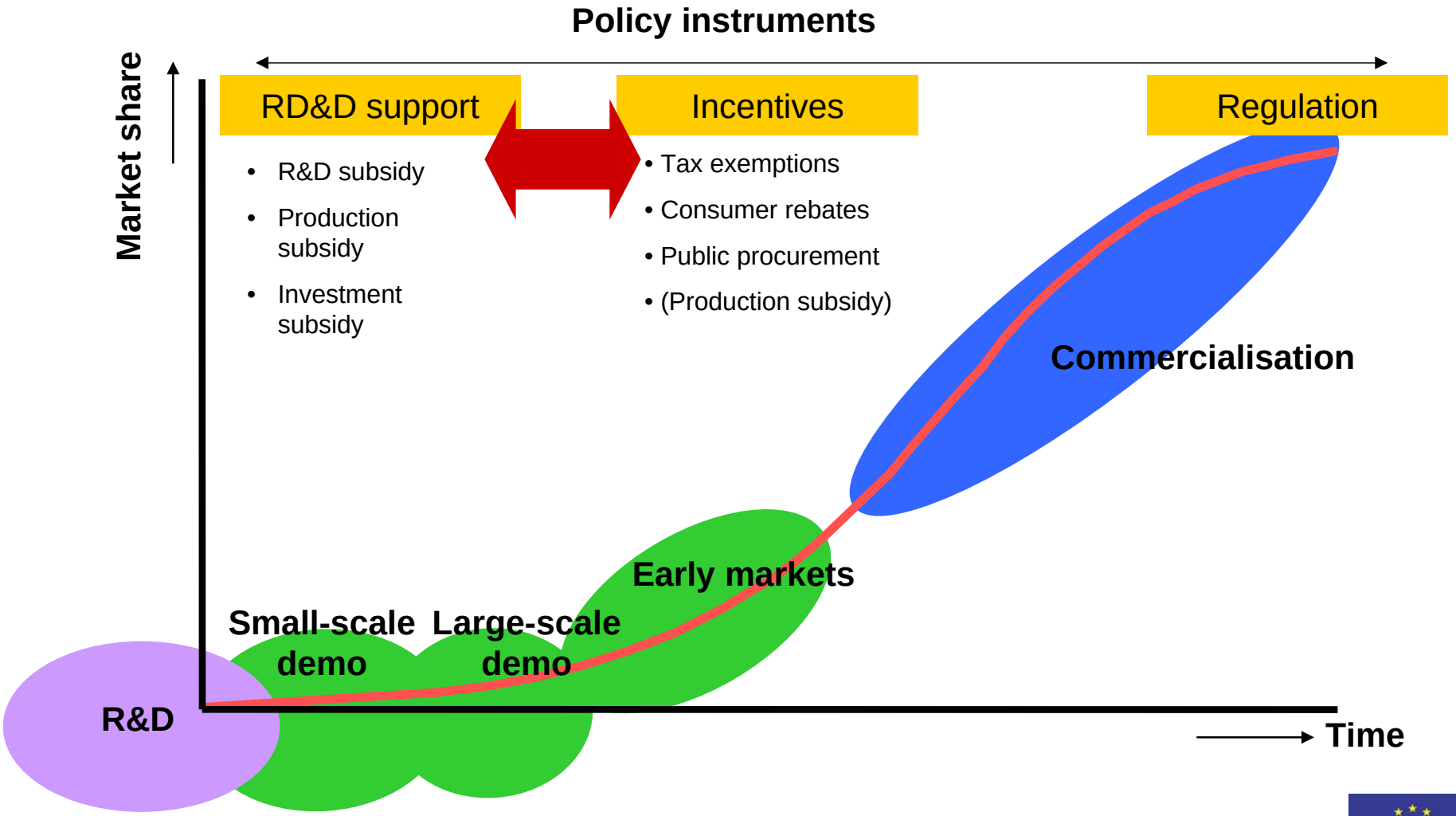

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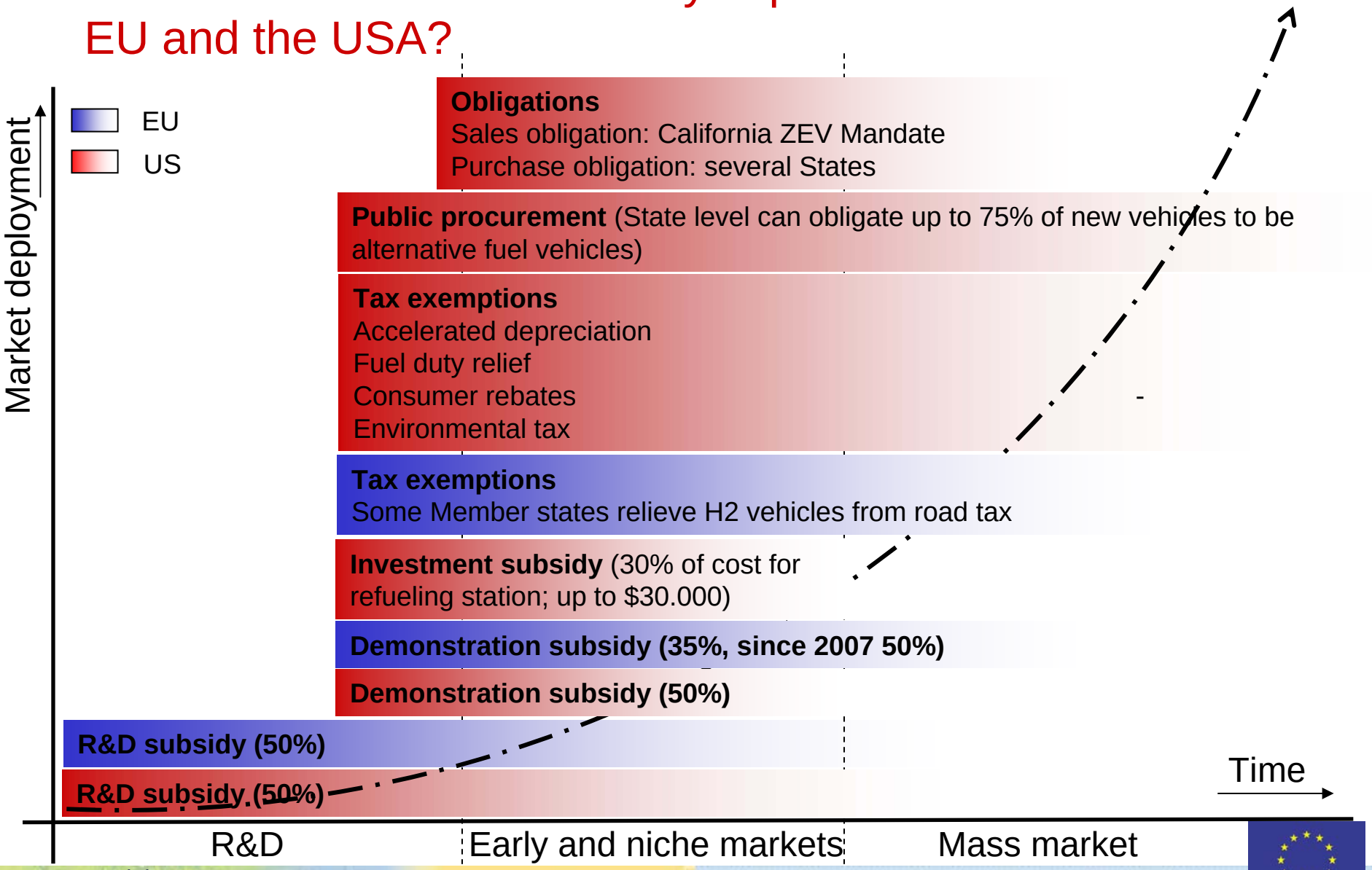
Which incentives are currently in place in the EU and the USA?



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Which incentives are currently in place in the EU and the USA?

- In Europe there is currently the tendency to subsidize R&D and demonstration (and in some Member States exempt hydrogen vehicles from road tax)
- The US applies a variety of incentive hereby not only supporting the demonstration phase but also starts to prepare early market demand (by for instance requiring public procurement and sales obligations)

- There is a disturbance of the level playing field if you compare the incentives in the EU with the incentives in the US
  - Reason: difference in philosophy with respect to support of innovations
  - If Europe does not implement comparable incentives (higher support, regulation), they have to implement incentives with higher effectiveness

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Outline of a hydrogen specific support framework

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Summarizing:

- Existing generic support schemes are not suitable (not very effective) to support large scale demonstration phase and beyond
- In the first introduction phases, hydrogen specific support schemes are needed
- Starting point for support
  - The end-user has to pay (close to) what he/she is used to (€/km)
  - There has to be a balance between vehicle and fuel cost

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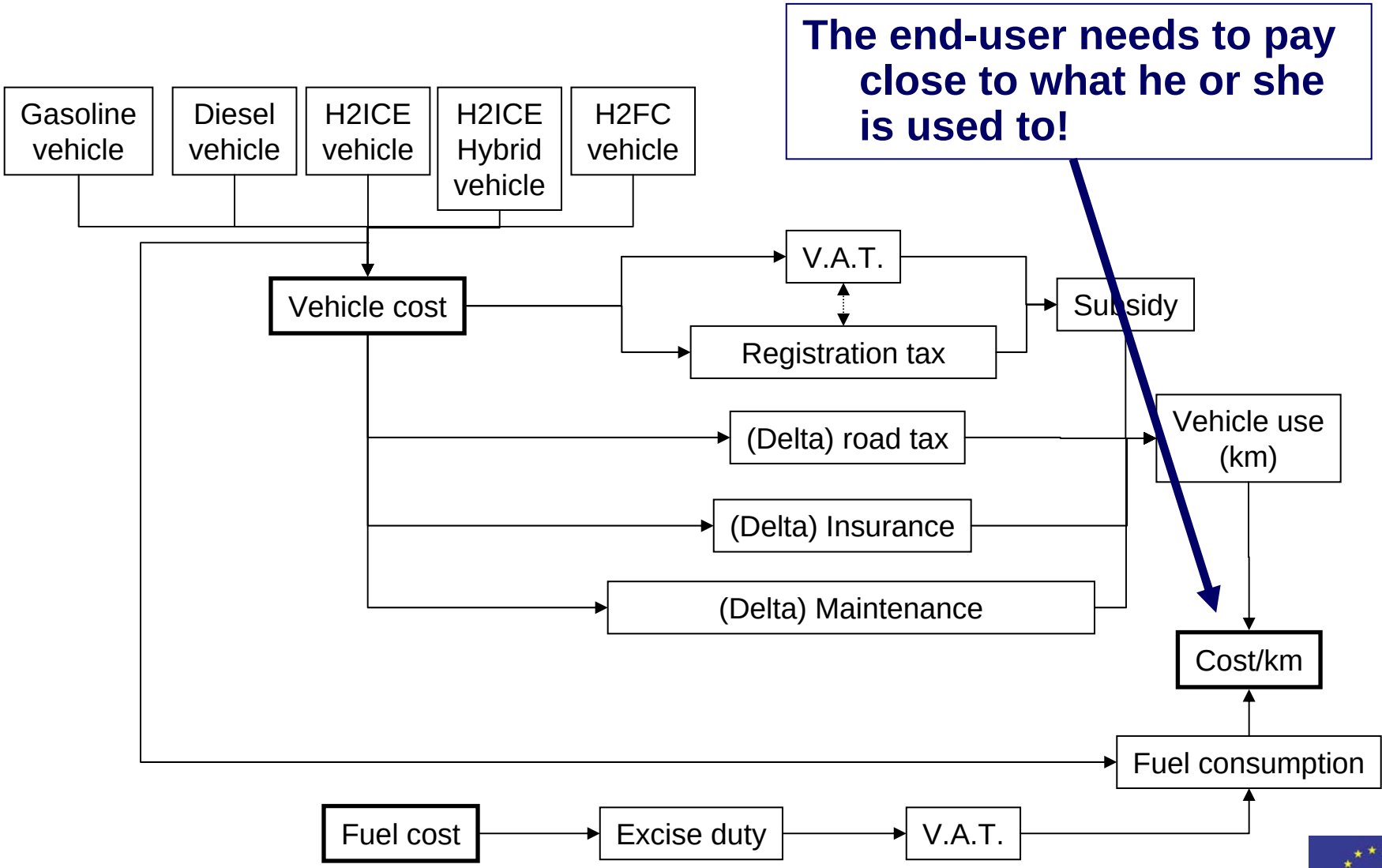
What are the future needs?



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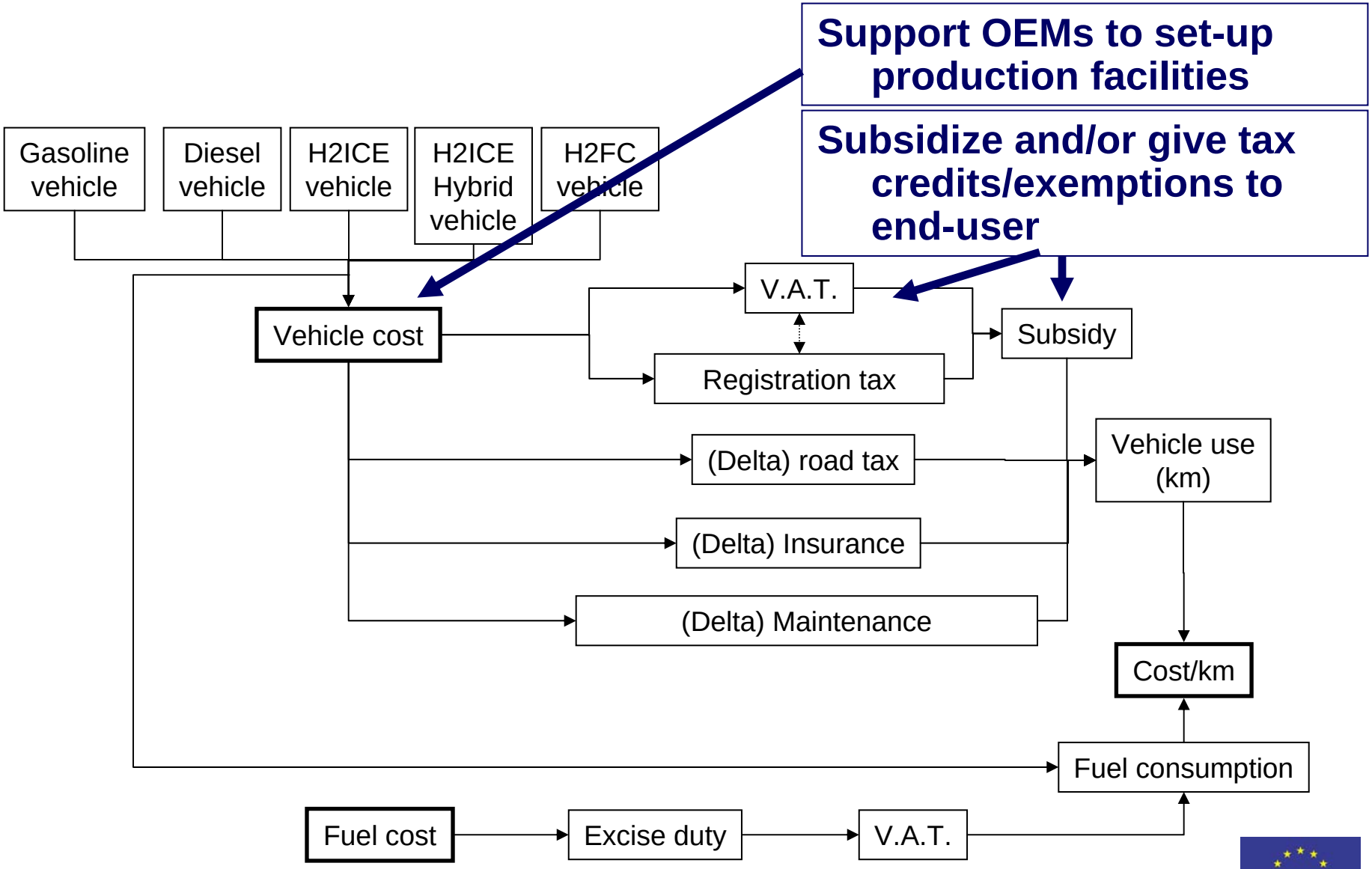
What are the future needs?



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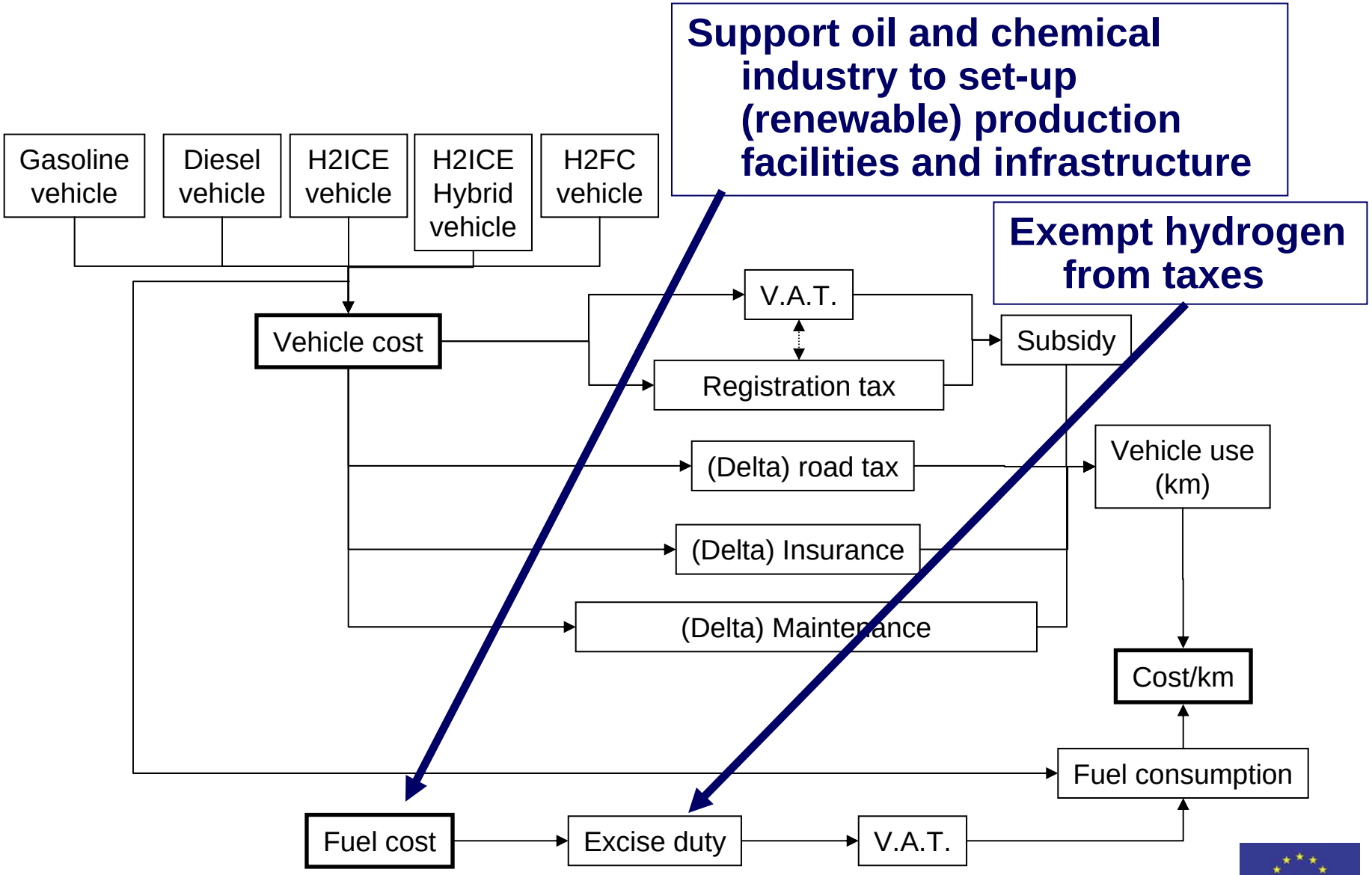

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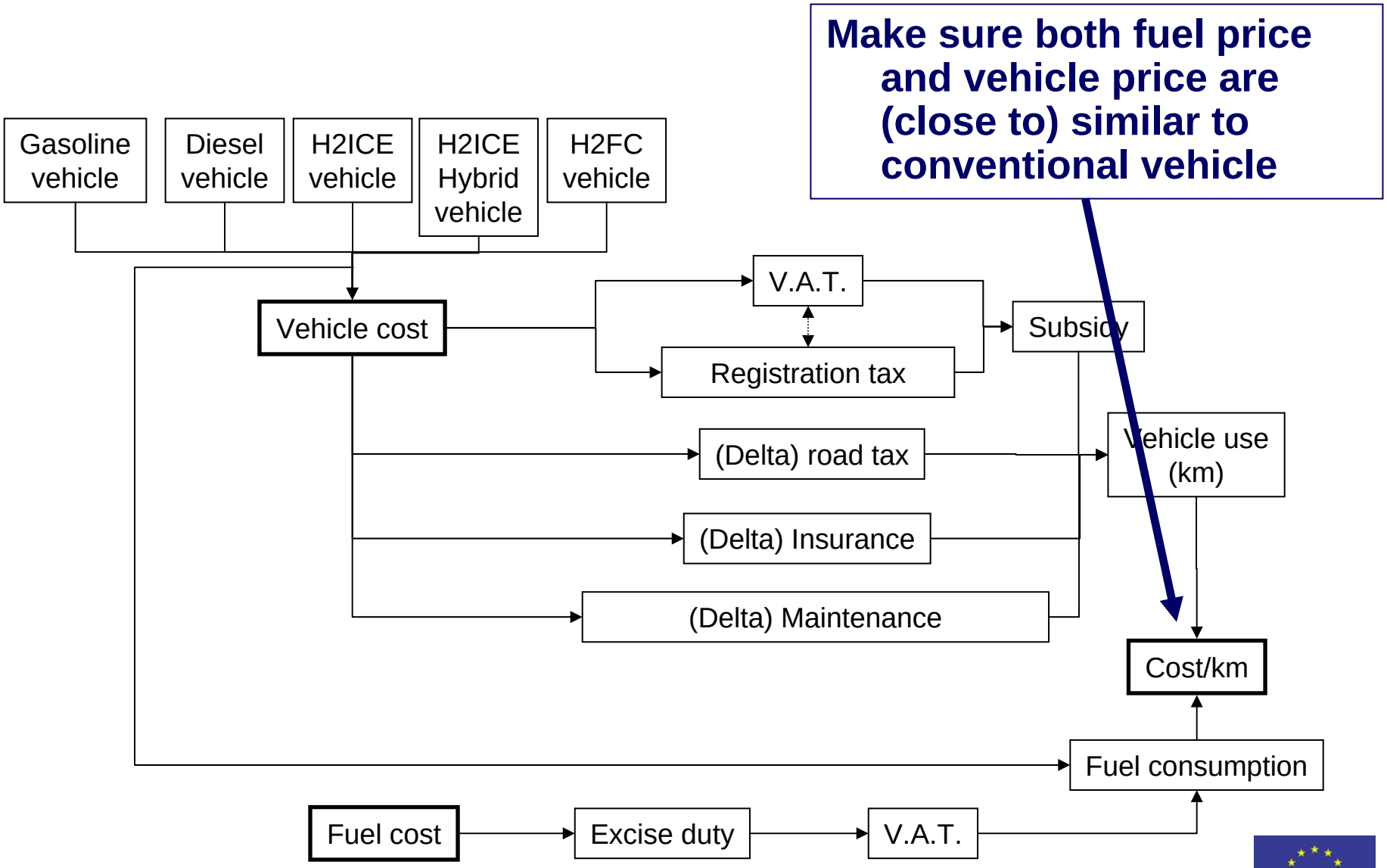

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What are the future needs?

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In addition: non-financial support

- Non financial support can increase public acceptance and can stimulate early market demand
- Some examples are:
  - Exception of limited city centre access
  - Use of bus lanes or carpool lanes
  - Free parking or dedicated parking near the office, malls, etc.
  - Free use of toll roads
  - Free use of public transport when using ‘park and ride’
  - Taxies are allowed to become first in line

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Thanks for your attention

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More information can be found at

www.hylights.eu

Or contact

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Backup slides

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What are the possible incentives for producers and consumers?

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- R&D subsidies (supporting investments in equipment and labour)
- Investment subsidies (supporting investments new facilities)
- Production subsidies (supporting the running cost and operation of technologies)
- Zero and low interest loans (reducing cost of capital)
- Tendering and bidding (a selection procedure which selects the most cost effective beneficiary that receives support for investments and or operation of a technology)
- Fiscal reductions and exemptions (tax exemptions (eco-tax) or credits for use or purchase)
- Quota obligations (obligating use, purchase or sales of a technology)
- Emission trading (creates benefits for external effects like CO2 emission)
- Environmental regulation or standards (set standards or minimal technological requirement)
- Public and commercial procurement (governments or companies will buy certain technologies when they meat their criteria)
- Voluntary agreements

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What are the future needs?

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Long-term, continuous, flexible and hydrogen specific support is needed

- A generic support framework (e.g. CO_2 taxation, emission trading) will decrease the attractiveness of the conventional technology, but will even more increase the attractiveness of (incremental) competitors of hydrogen

- The barriers will change in time with improving competitiveness of the technology
  - This can go rather fast in the take off phase of a technology
  - The policy framework has to adapt to the changing characteristics (improved performance)

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Are there needs for policy support and incentives?

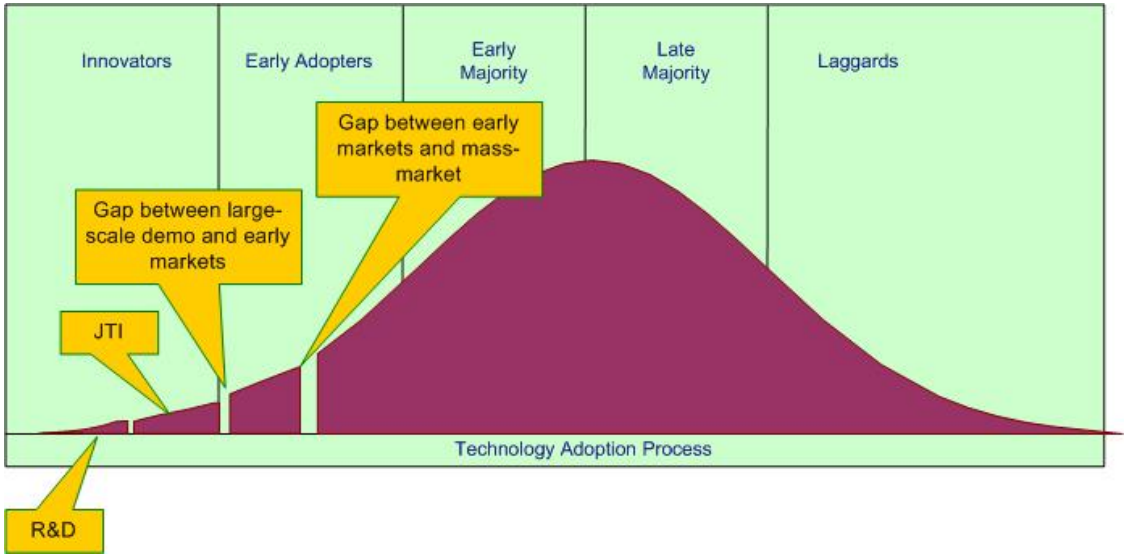
From a stakeholder point of view:

Technology developers (e.g. OEMs) have already made high investments and have to make even bigger investments in the future

- There is a need for a long term hydrogen specific support scheme justifying their investment and creating some certainty for the return on investment

Consumers

- In the end the end user does not want to pay more ($/mile) then they are used to
- There has to be a balance between vehicle and fuel costs



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What are the future needs?

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To stimulate the production of hydrogen:

- Investment and production subsidies, fiscal reductions and (eco) tax exemptions (excise duty)
- There can be a distinction in support based on the technology used to produce hydrogen (f.e. sustainable technologies get higher support)

To stimulate the distribution and refueling:

- Large investments have to be made in pipeline networks, investment subsidies and zero or low interest loans help carry this burden
- Incentives could depend on the network density

To stimulate end use (vehicles and fuel):

- The end-user needs to pay close to what he or she is used to, so tax exemptions need to be in place
- Additional subsidies (tax credits) further reduce cost for the end user
- The automotive industry also need investment and production subsidies to set up new production sites

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Current incentives

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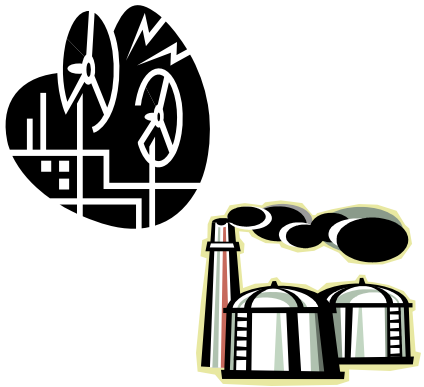
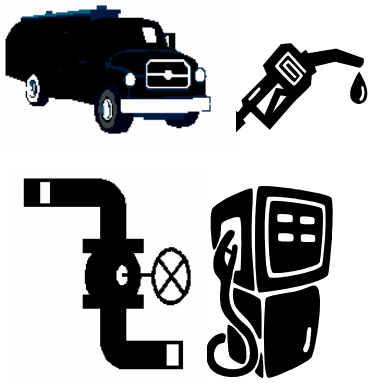
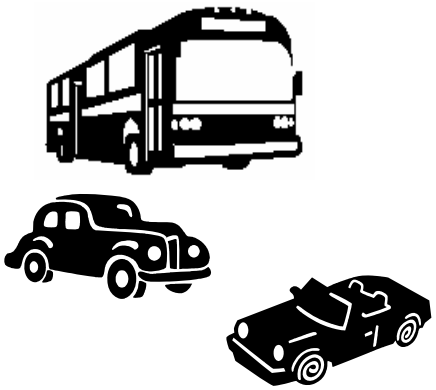
H_2 system	Production	Distribution and storage	End-use
			
US	Demonstration: funding 50%	Tax credit (30% up to $30.000) for refueling station Demonstration: funding 50% 50% tax reduction	Vehicle credits ($4000 - $40.000), income tax exception, & public procurement Demonstration: funding 50% License fee, fuel, registration, purchase, tax exemption Purchase requirement (up to 75% of new vehicles), sales mandate
EU	FWP: 35% demonstration, 50% R&D, 100% education	FWP: 35% demonstration, 50% R&D, 100% education (Biofuels directive)	FWP: 35% demonstration, 50% R&D, 100% education

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Are there needs for policy support and incentives?

- Without technology specific support, hydrogen might not become relevant before the competing incremental innovations have failed
  - By that time, we still need decades to fully commercialize hydrogen
  - A smooth transition starting now is preferred,
  - In the mean time incremental alternatives are temporarily needed, but lock-in effects need to be avoided

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